HF jets analysis

18.11.2019 ALICE@IFJ meeting

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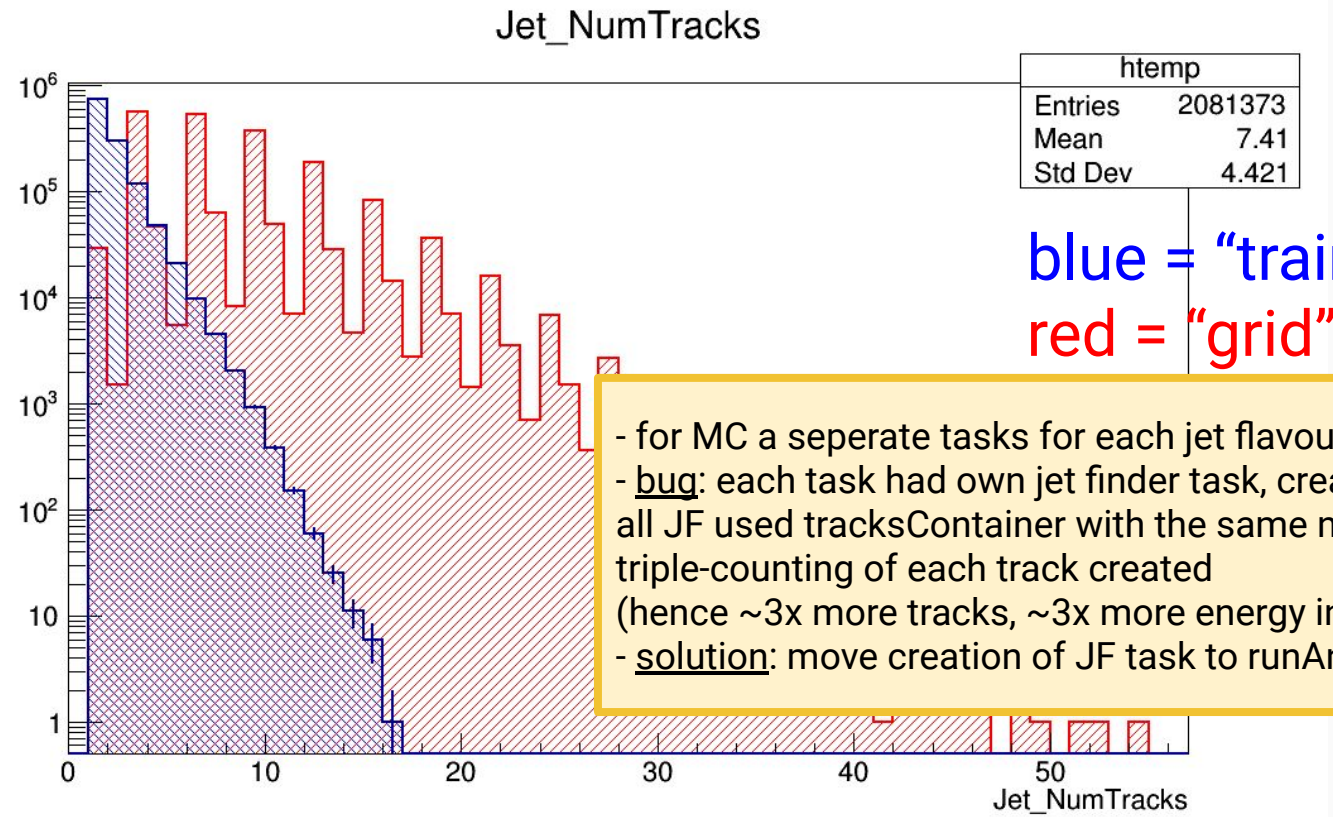
Outline

1. What was done
2. Issues and questions
3. Plans for next week

Outline

1. **What was done**
2. Issues and questions
3. Plans for next week

Blocker from last week solved!



blue = “train”

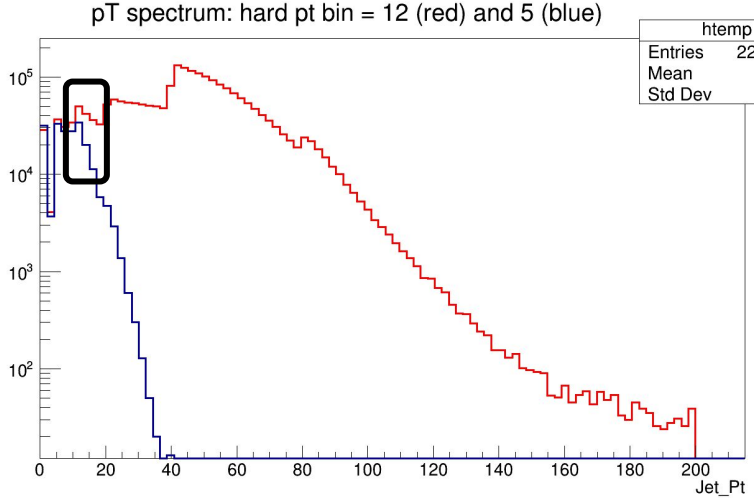
red = “grid”

- for MC a seperate tasks for each jet flavour is used
- bug: each task had own jet finder task, created in AddTask* macro but all JF used tracksContainer with the same name which lead to triple-counting of each track created
(hence ~3x more tracks, ~3x more energy in jet and step on the plot)
- solution: move creation of JF task to runAnalysis macro

Comparison of MC to data based on 1D histograms

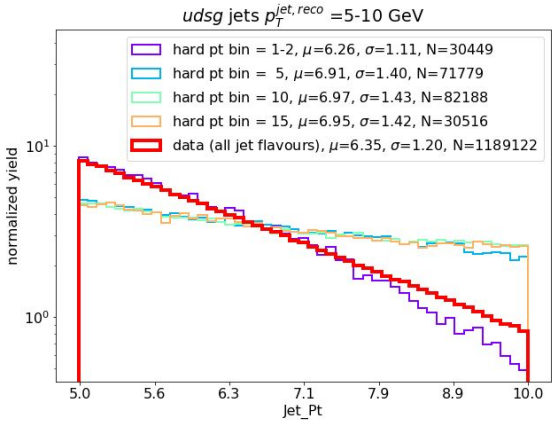
What is the MC I should compare to?

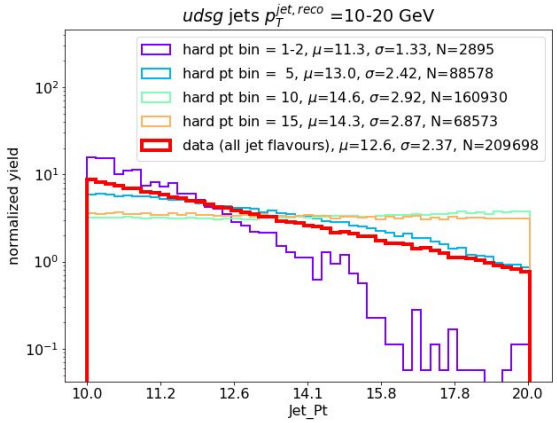
- MC simulated in hard pT bins
- for each hard pT bin we obtain whole spectrum of reconstructed jets' pT, starting from low values and and actually not ending around hard pT bin end
  (bin 5: 16-21 GeV, bin 12: 85-99 GeV)

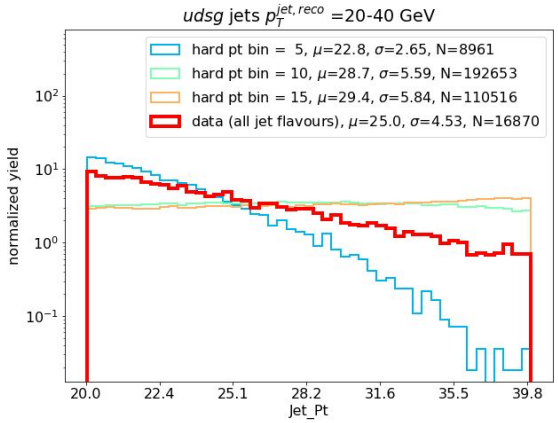


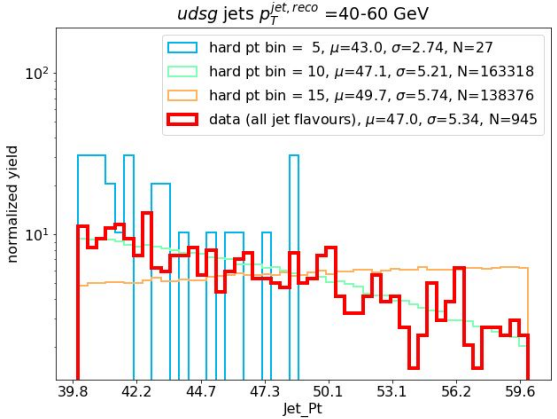
- Q: If jets generated in different hard pT bins are distinguishable?
- *Same differences may appear due to different pT spectrum shape in considered jet pT bin*

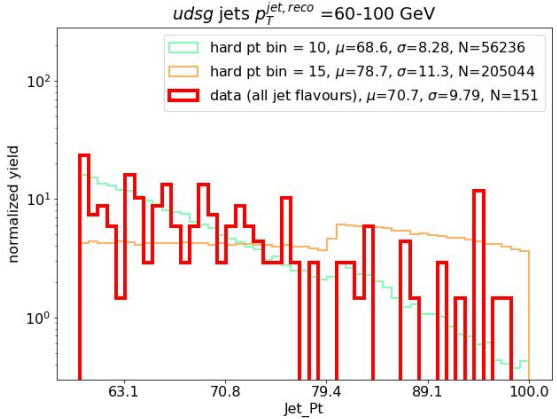
jet reco. pT

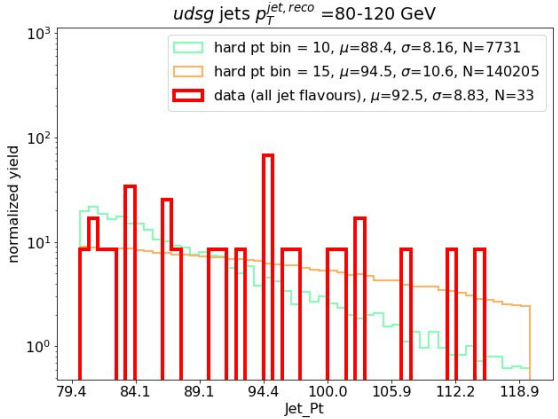

udsg jets $p_T^{jet,reco}$ =5-10 GeV
hard pt bin = 1-2, μ=6.26, σ=1.11, N=30449
hard pt bin = 5, μ=6.91, σ=1.40, N=71779
hard pt bin = 10, μ=6.97, σ=1.43, N=82188
hard pt bin = 15, μ=6.95, σ=1.42, N=30516
data (all jet flavours), μ=6.35, σ=1.20, N=1189122
normalized yield
Jet_Pt


udsg jets $p_T^{jet,reco}$ =10-20 GeV
hard pt bin = 1-2, μ=11.3, σ=1.33, N=2895
hard pt bin = 5, μ=13.0, σ=2.42, N=88578
hard pt bin = 10, μ=14.6, σ=2.92, N=160930
hard pt bin = 15, μ=14.3, σ=2.87, N=68573
data (all jet flavours), μ=12.6, σ=2.37, N=209698
normalized yield
Jet_Pt


udsg jets $p_T^{jet,reco}$ =20-40 GeV
hard pt bin = 5, μ=22.8, σ=2.65, N=8961
hard pt bin = 10, μ=28.7, σ=5.59, N=192653
hard pt bin = 15, μ=29.4, σ=5.84, N=110516
data (all jet flavours), μ=25.0, σ=4.53, N=16870
normalized yield
Jet_Pt


udsg jets $p_T^{jet,reco}$ =40-60 GeV
hard pt bin = 5, μ=43.0, σ=2.74, N=27
hard pt bin = 10, μ=47.1, σ=5.21, N=163318
hard pt bin = 15, μ=49.7, σ=5.74, N=138376
data (all jet flavours), μ=47.0, σ=5.34, N=945
normalized yield
Jet_Pt

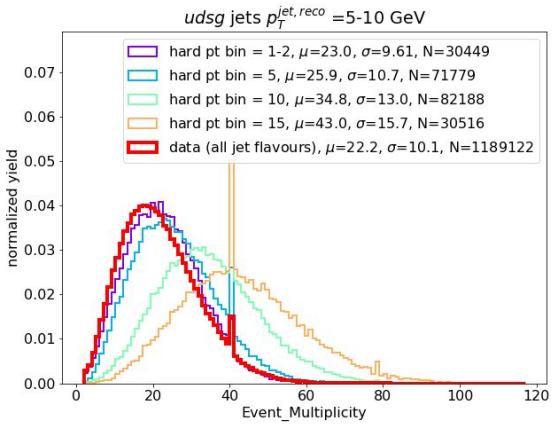

udsg jets $p_T^{jet,reco}$ =60-100 GeV
hard pt bin = 10, μ=68.6, σ=8.28, N=56236
hard pt bin = 15, μ=78.7, σ=11.3, N=205044
data (all jet flavours), μ=70.7, σ=9.79, N=151
normalized yield
Jet_Pt

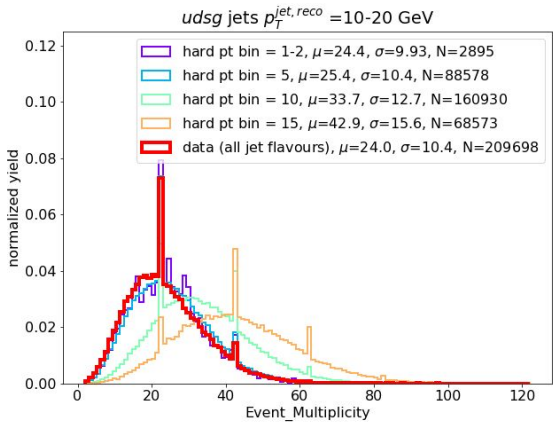

udsg jets $p_T^{jet,reco}$ =80-120 GeV
hard pt bin = 10, μ=88.4, σ=8.16, N=7731
hard pt bin = 15, μ=94.5, σ=10.6, N=140205
data (all jet flavours), μ=92.5, σ=8.83, N=33
normalized yield
Jet_Pt

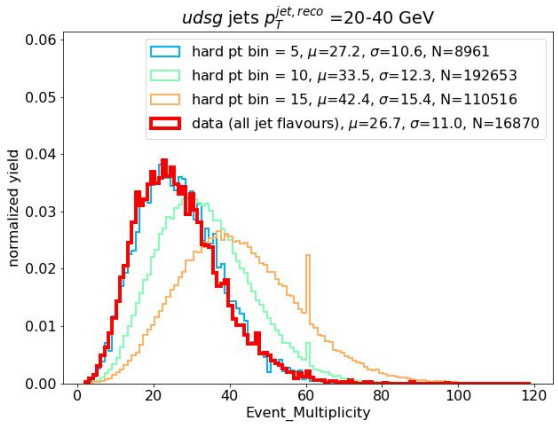
properties of events (in which jets were found)

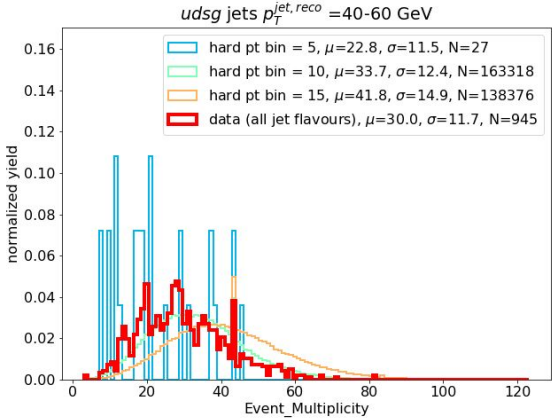
event multiplicity

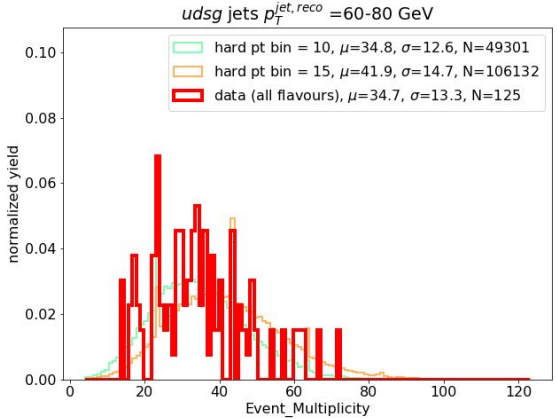
relatively large diff. between ptbins
softer ptbins consistent with data

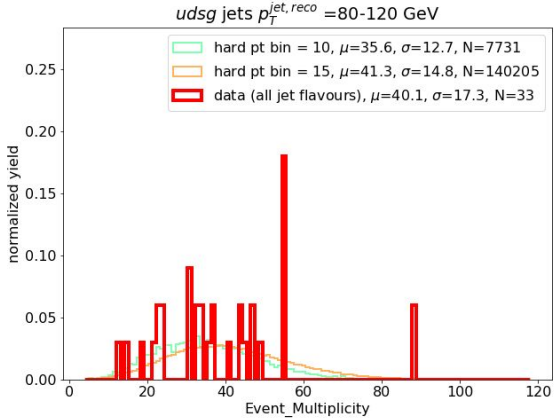






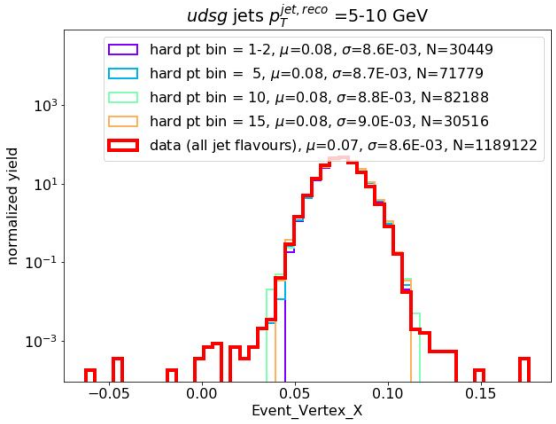


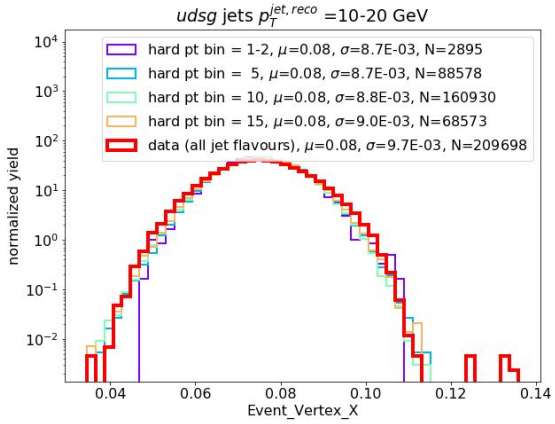


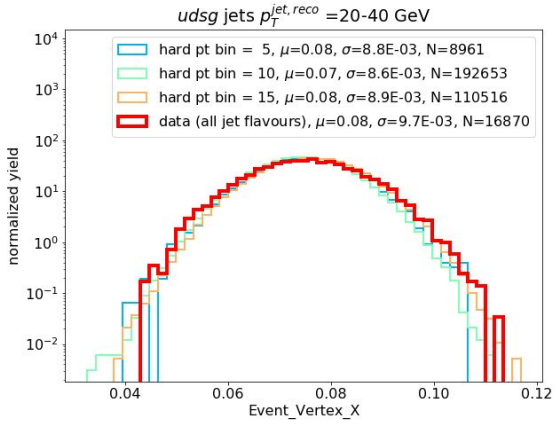


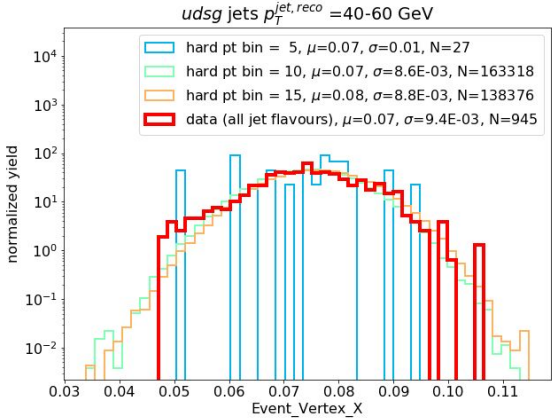
event vertex X

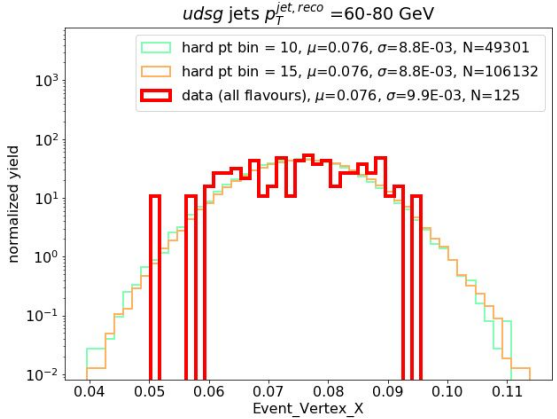
all MC ptbins consistent with the data

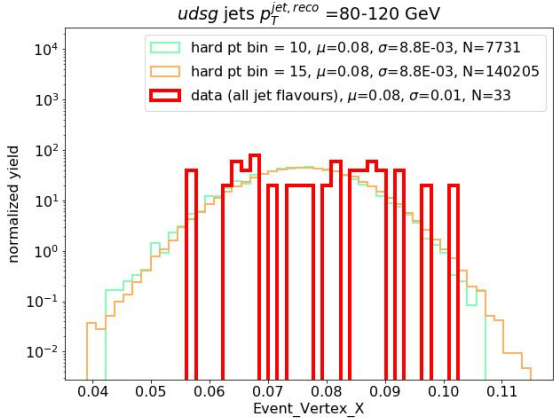






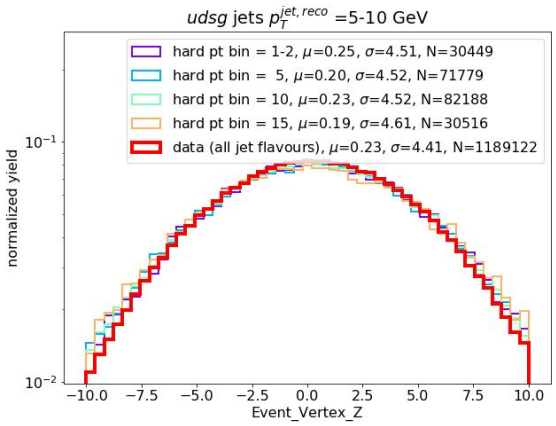


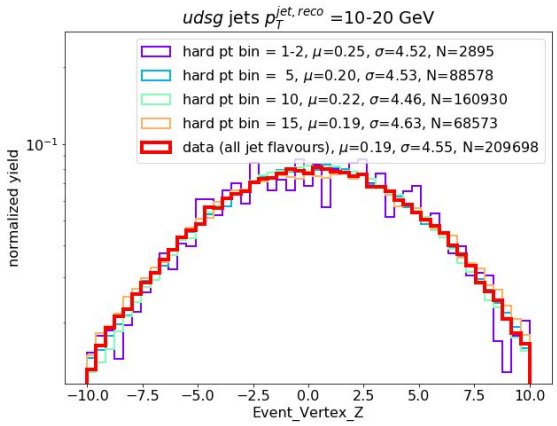


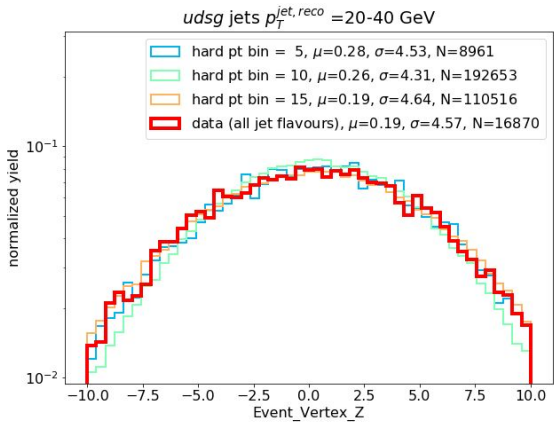


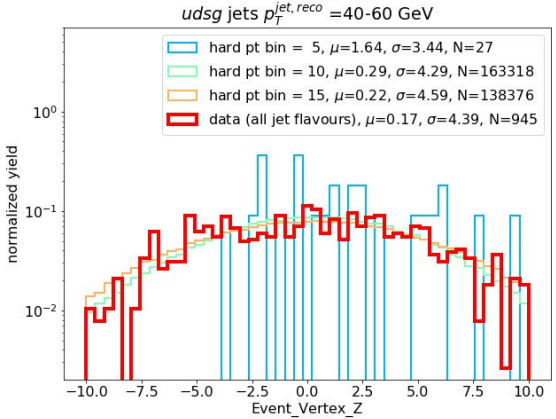
event vertex Z

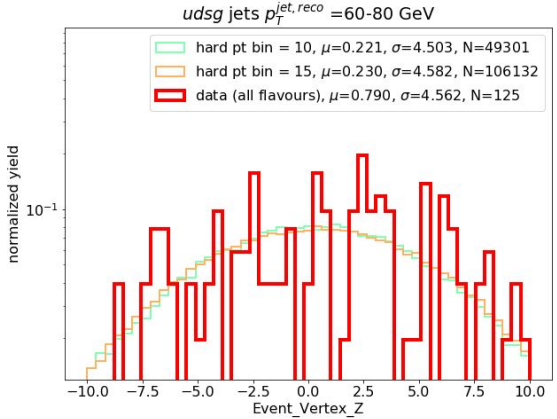
all MC ptbins consistent with the data

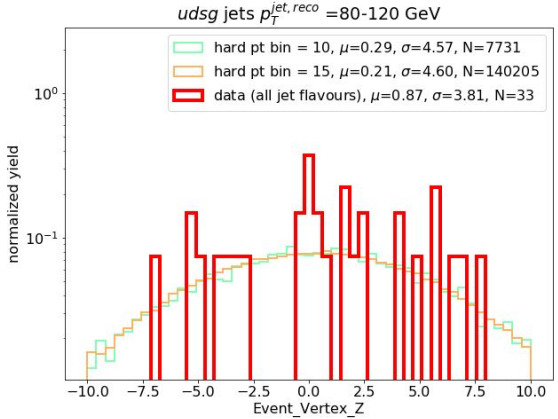








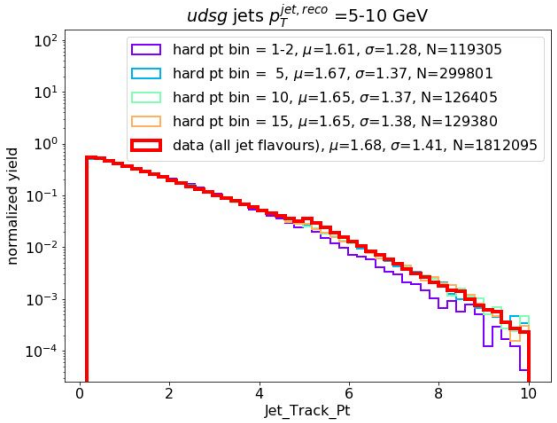


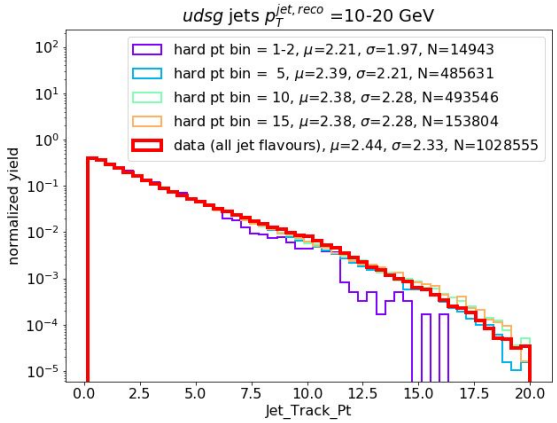


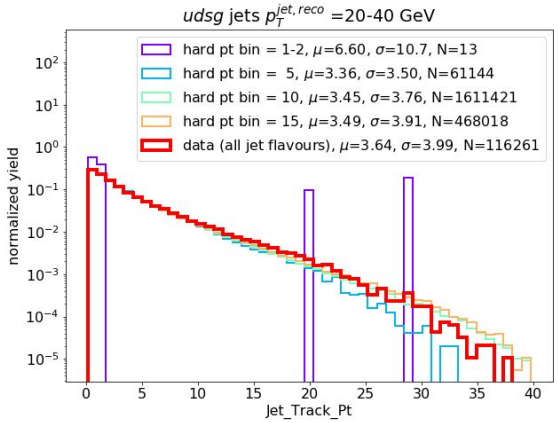
properties of tracks (belonging to jets)

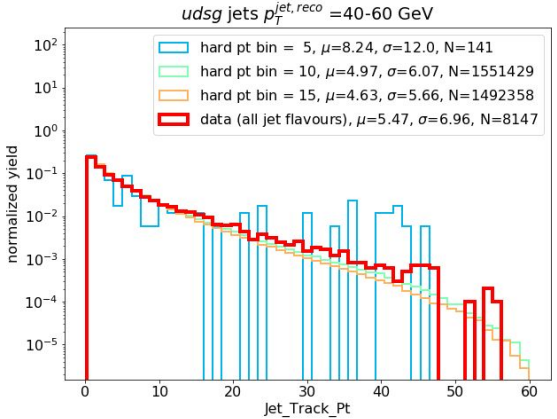
track's pT

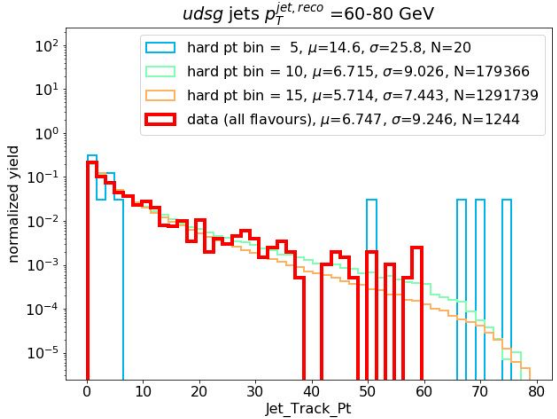
all MC ptbins similar and consistent with the data

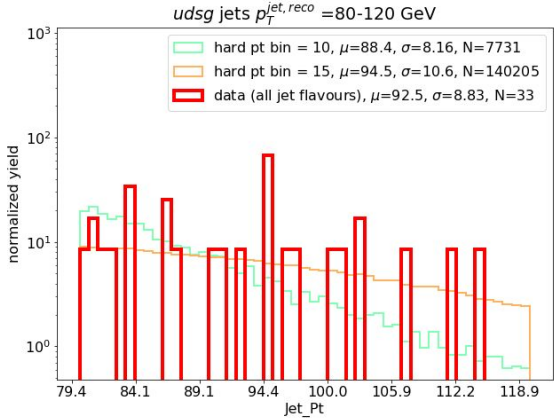






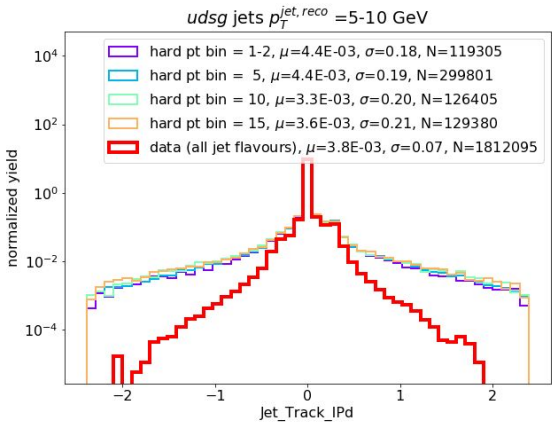


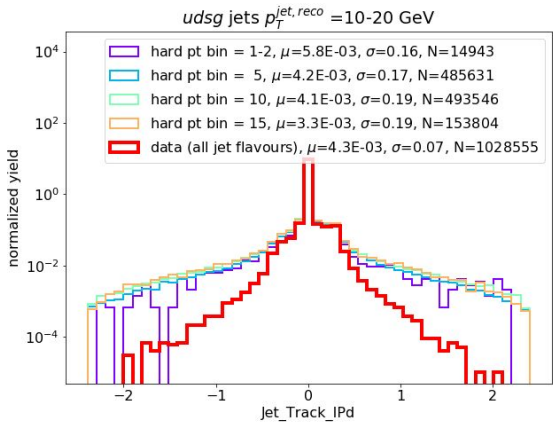


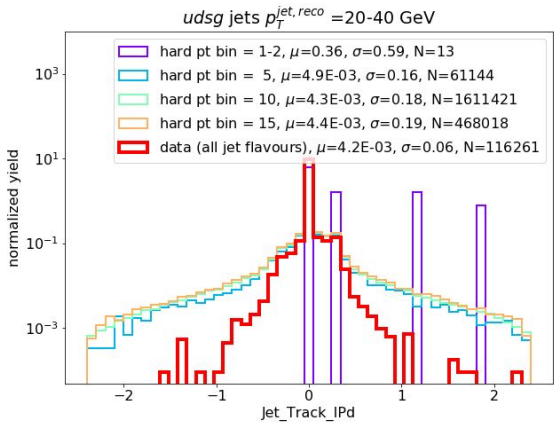


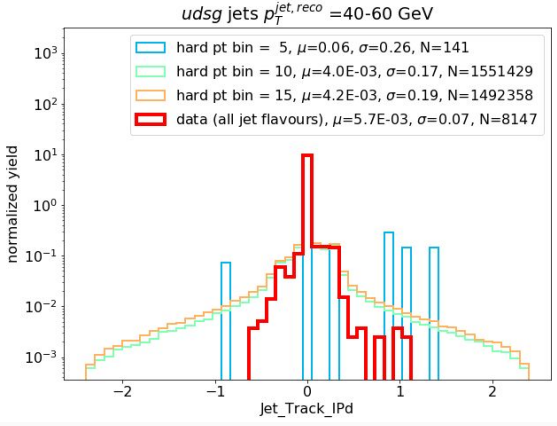
track's IPd

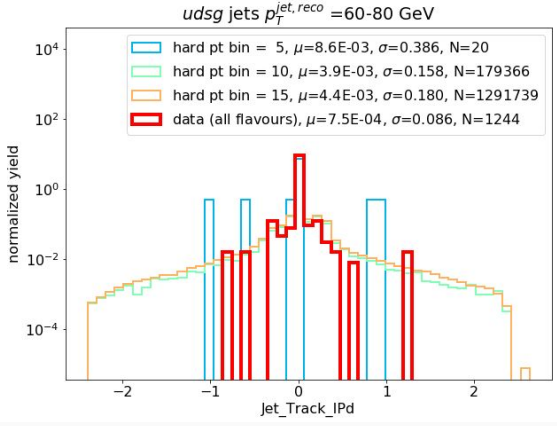
all ptbins similar but much (> factor 2)
wider distributions than in data - PRO8L3M as it's one of most important variables

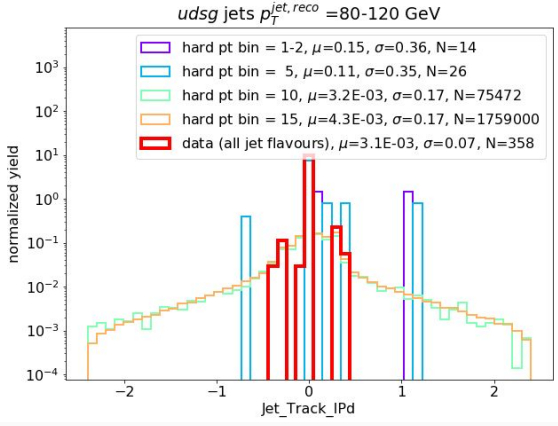






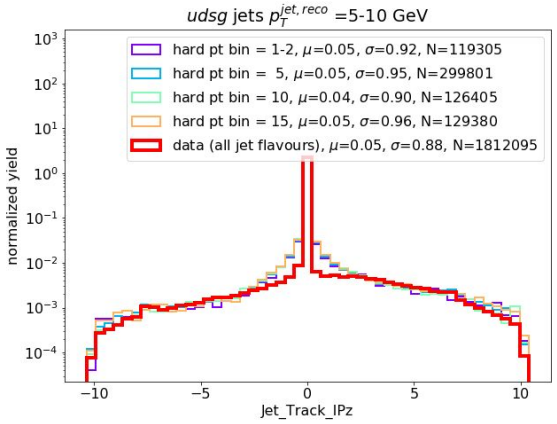


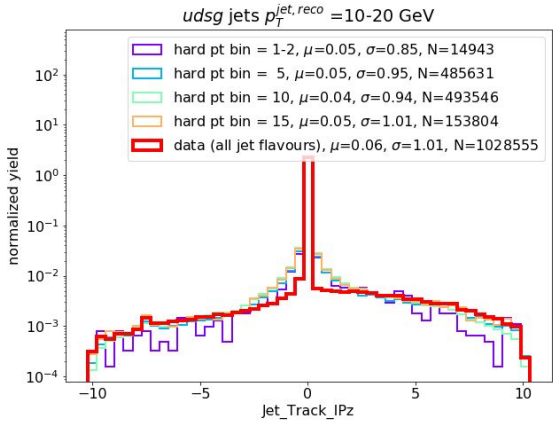


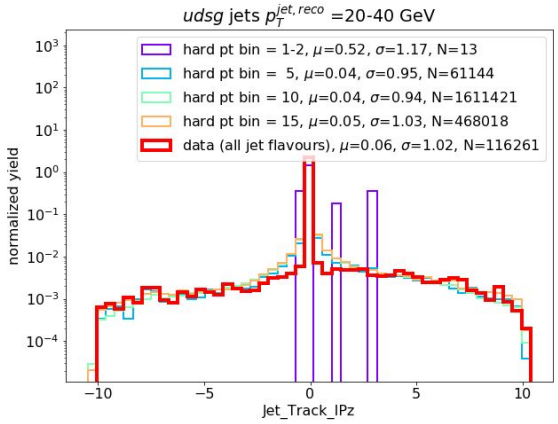


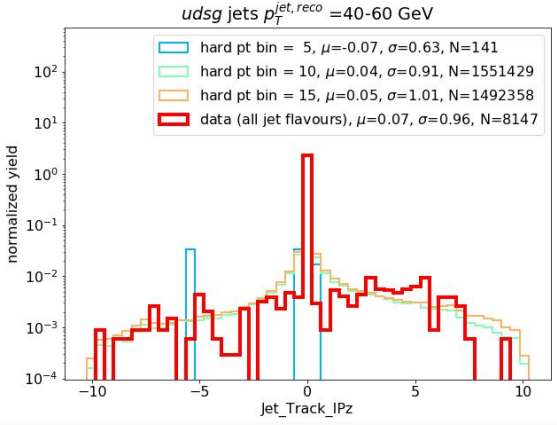
track's IPz

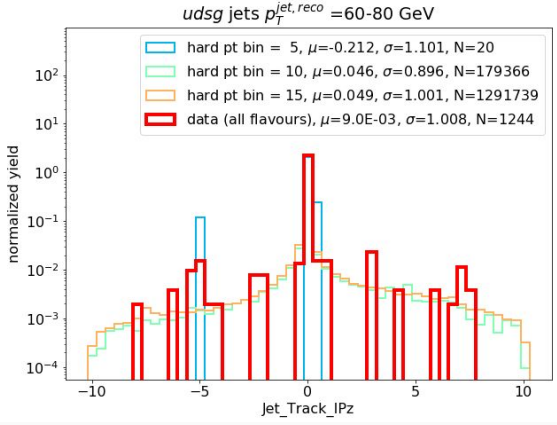
all ptbins similar and consistent with the data

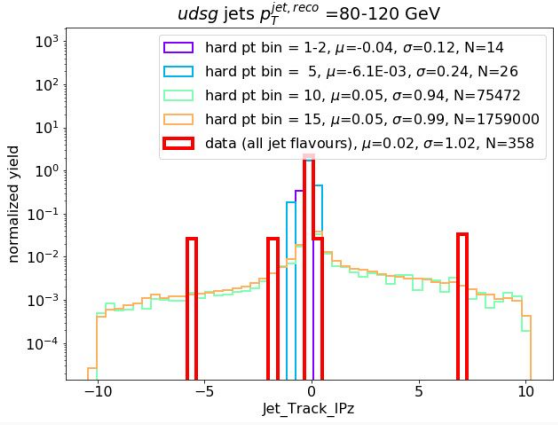






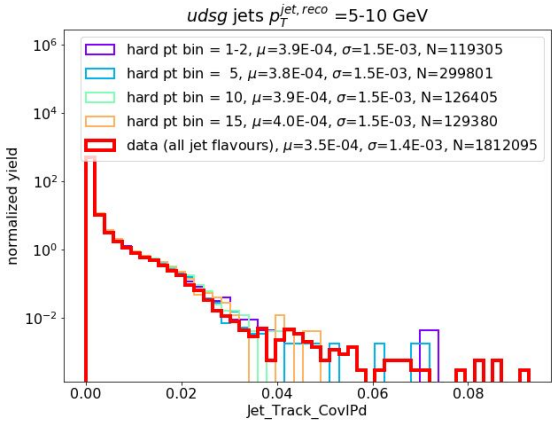


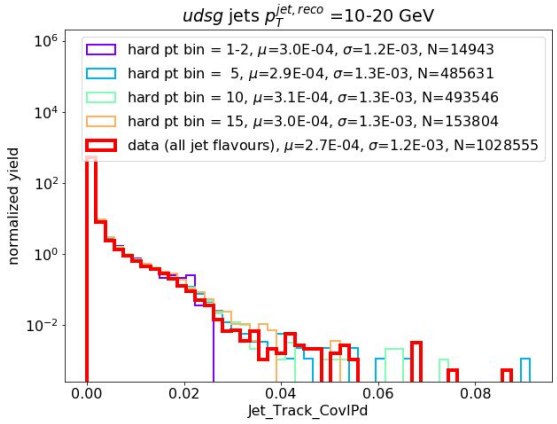


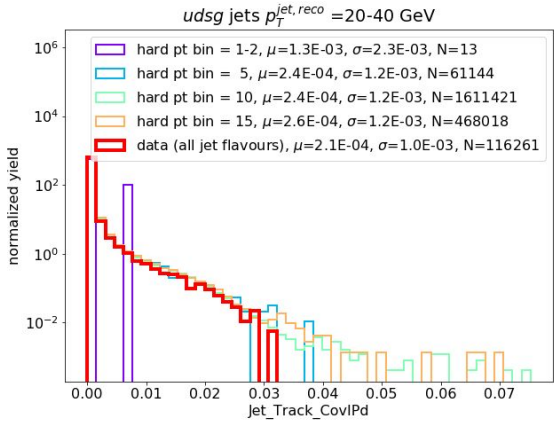


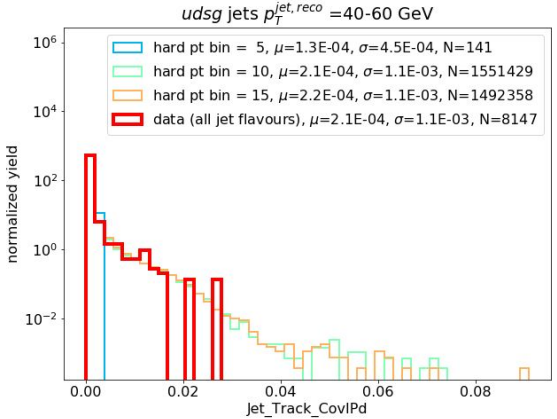
track's IPd sigma

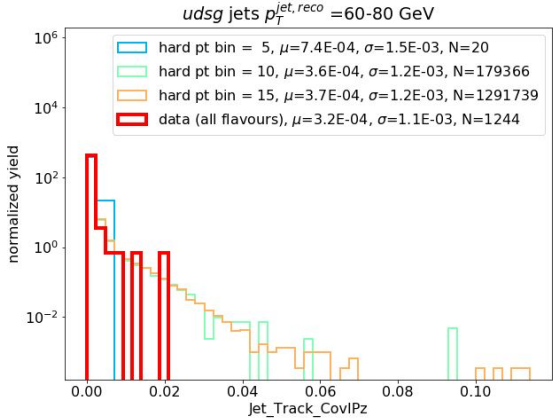
all ptbins similar and consistent with the data

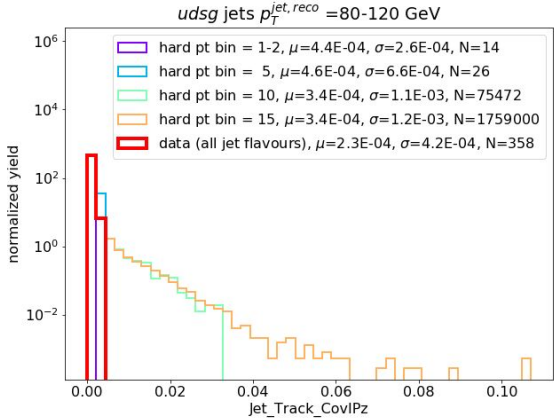






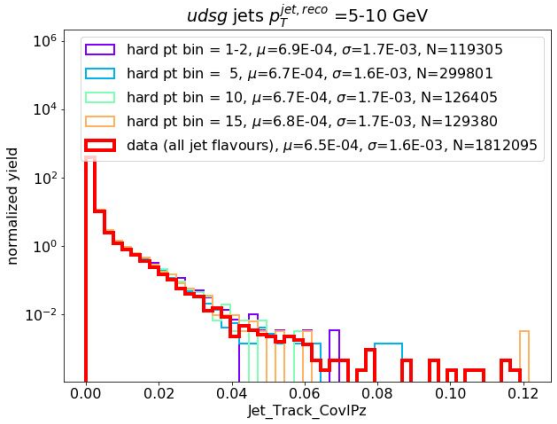


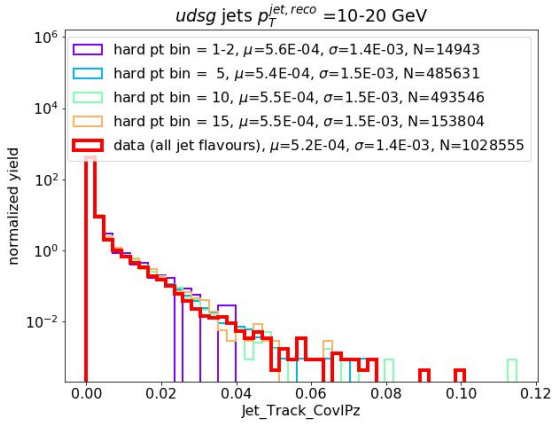


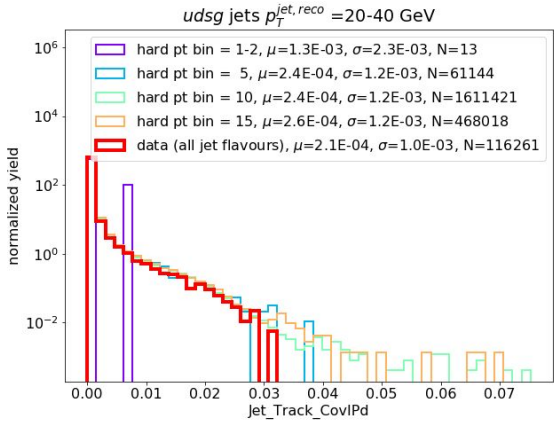


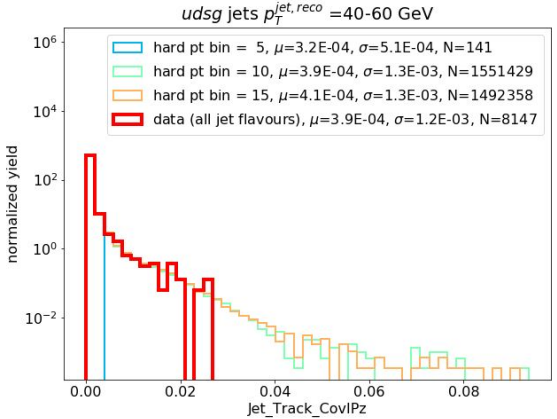
track's IPz sigma

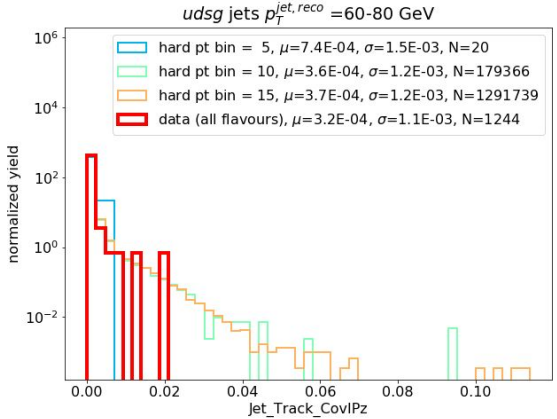
all ptbins similar and consistent with the data

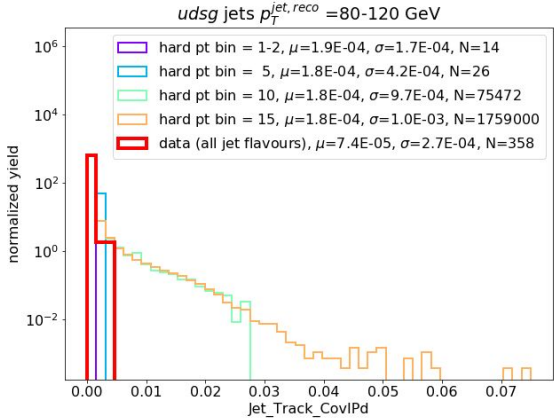








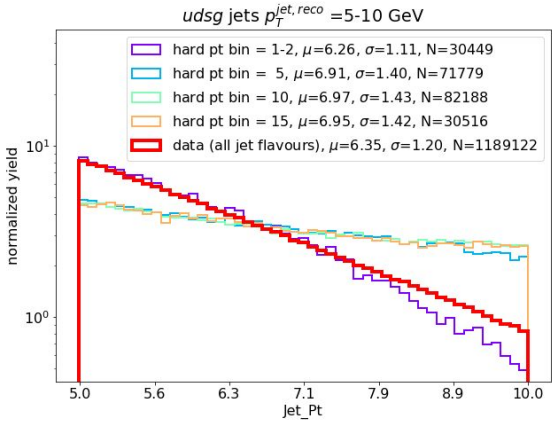


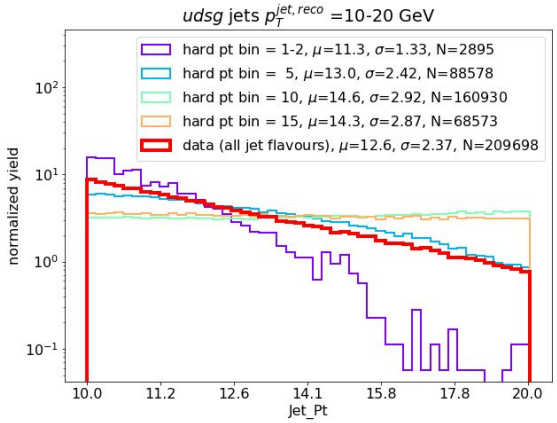


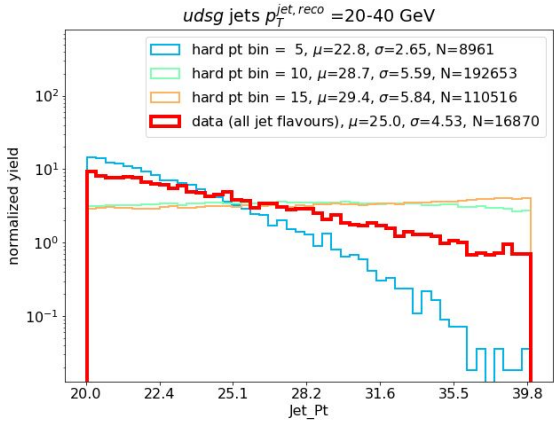
properties of jets

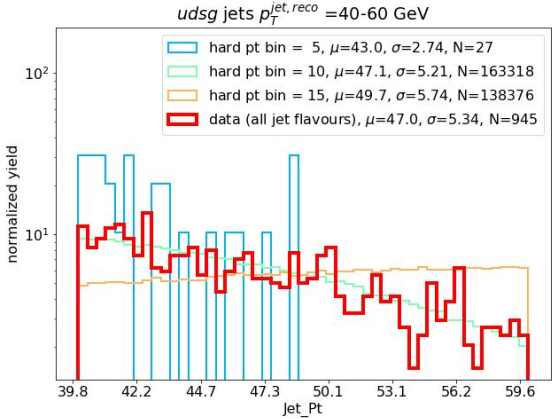
jet reco. pT

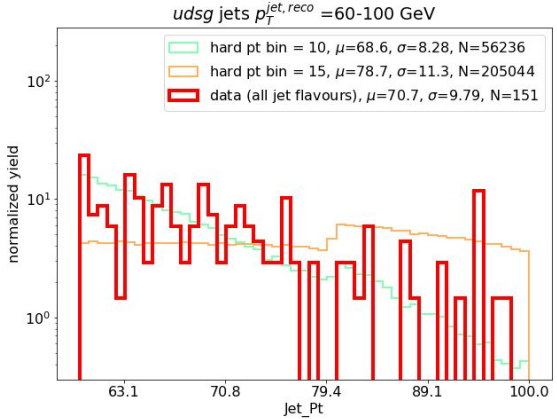
large diff. between ptbins, data has slope similar to one, specific ptbin depending on reco. pT range

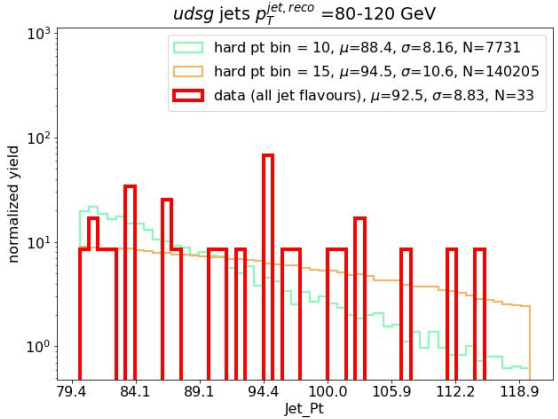






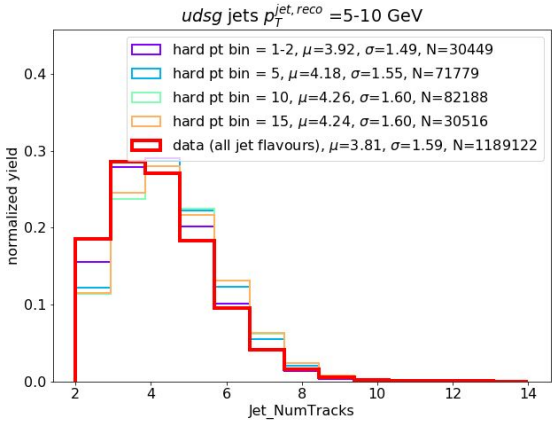


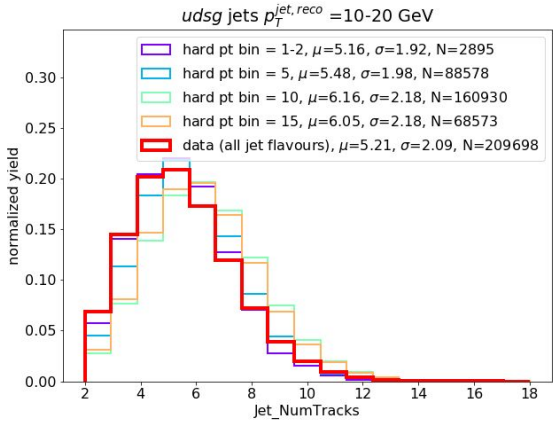


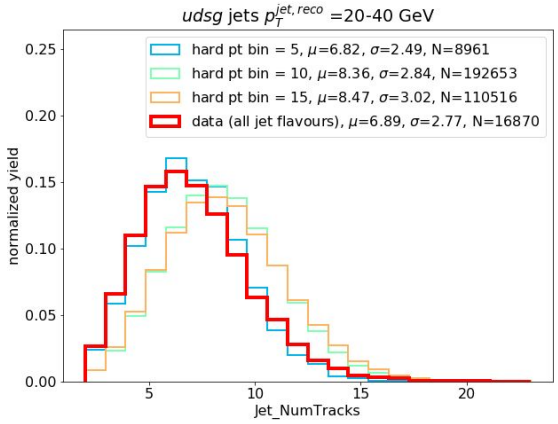


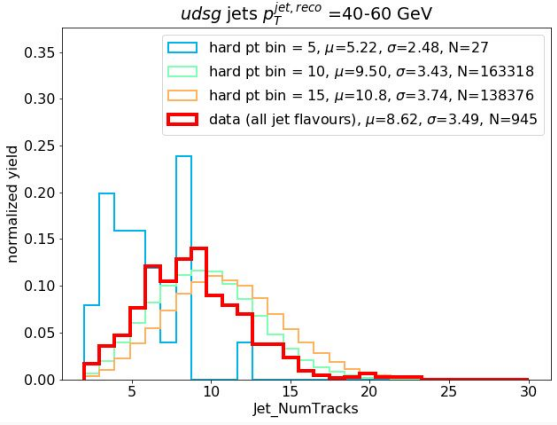
jet multiplicity

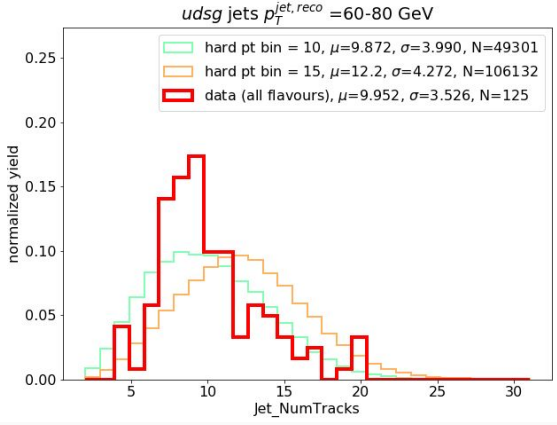
softer ptbins consistent with the data
some diff. between ptbins

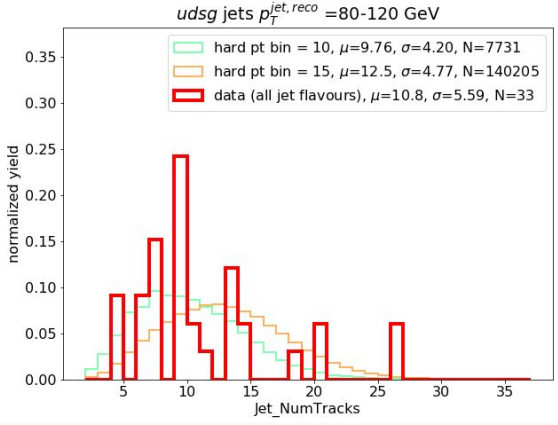






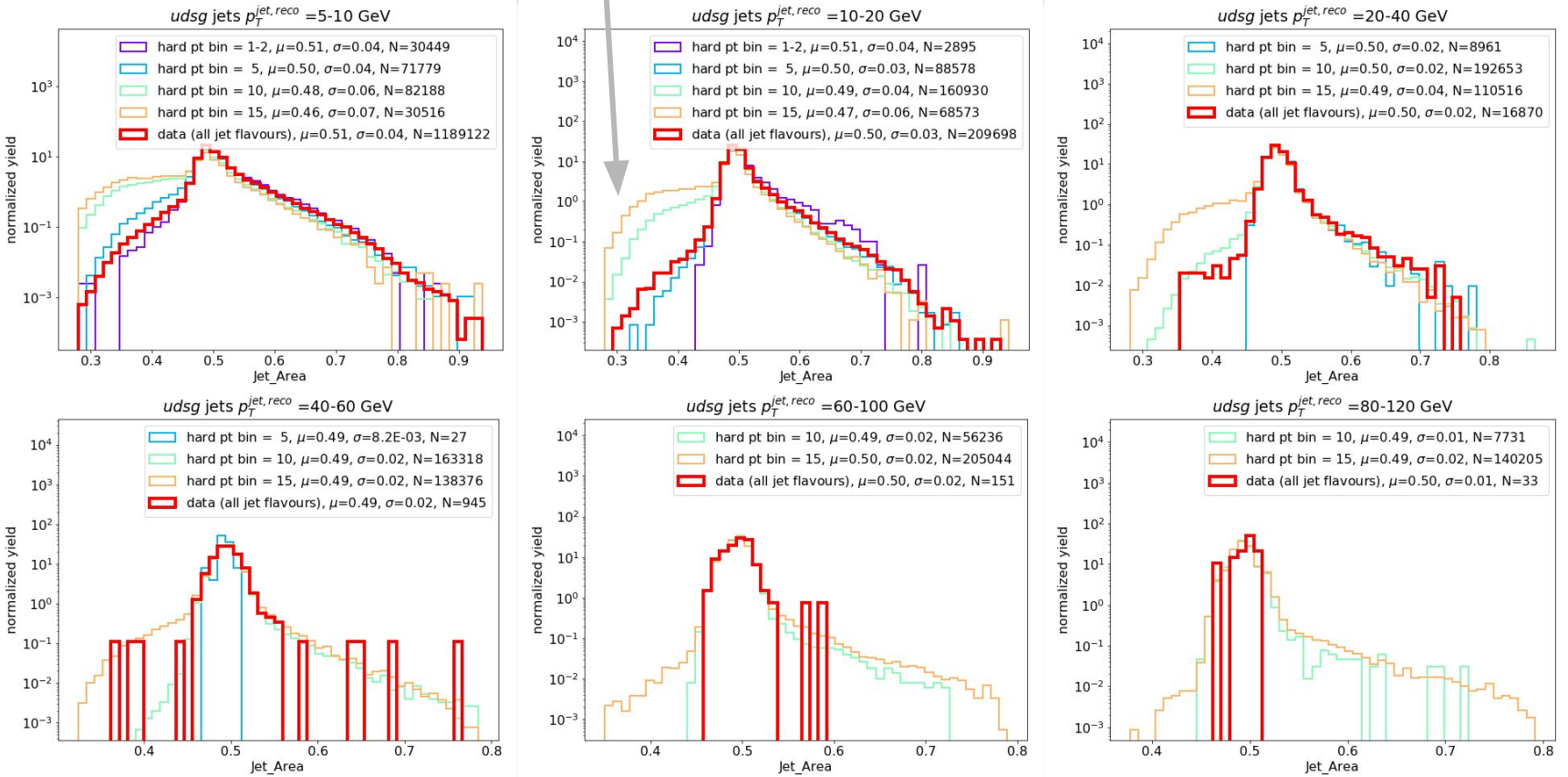






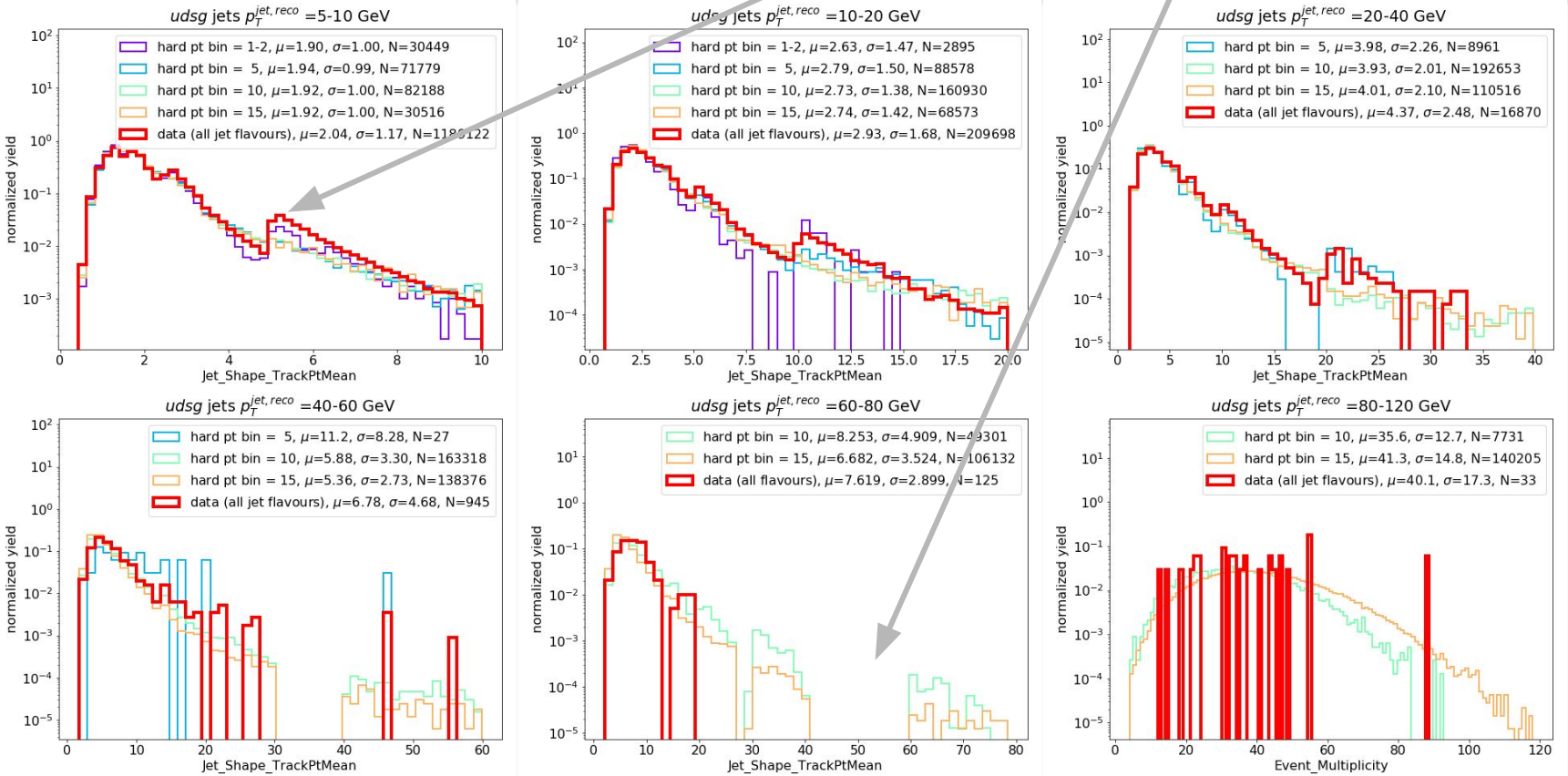
jet area

softer ptbins consistent with the data, significant diff. at low jet area



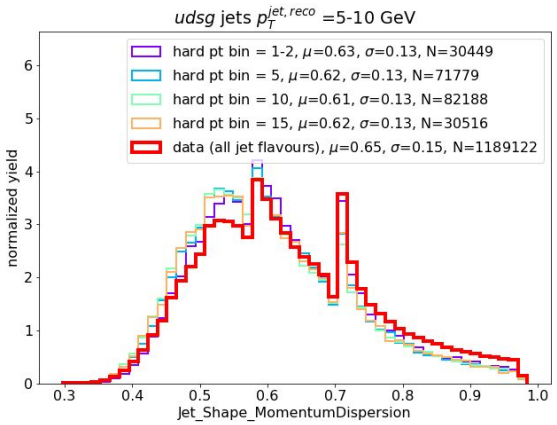
Jet trackMeanPt

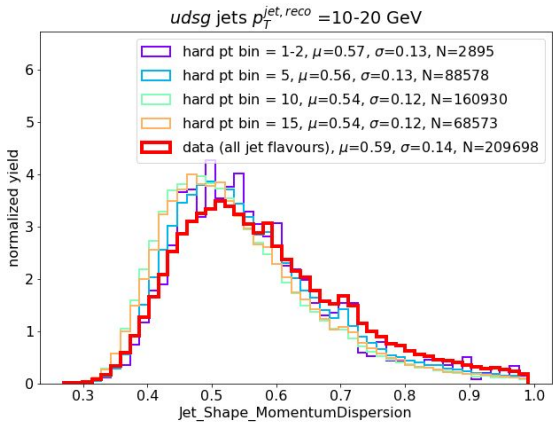
reasonable consistency
- holes due to 1-track jets
- min. pT of hardest track(?)

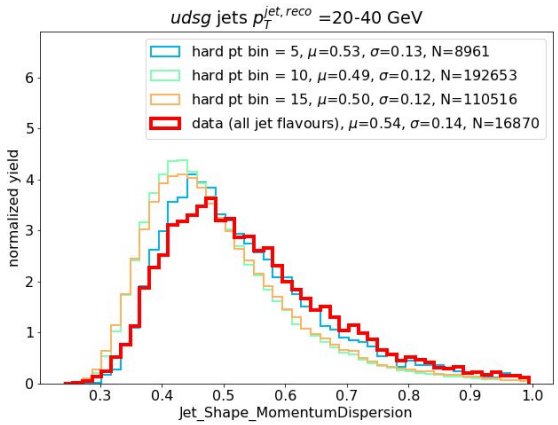


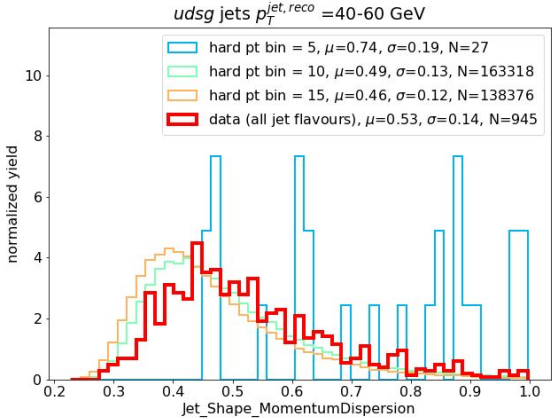
jet momentum dispersion

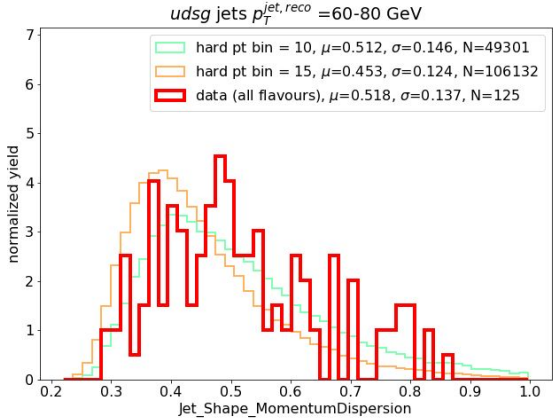
data slightly shifted towards higher values, softer ptbins closer

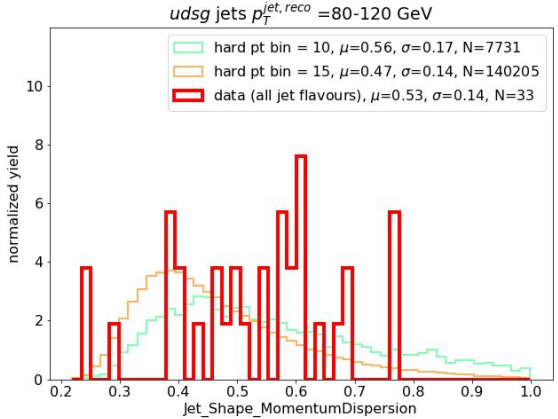






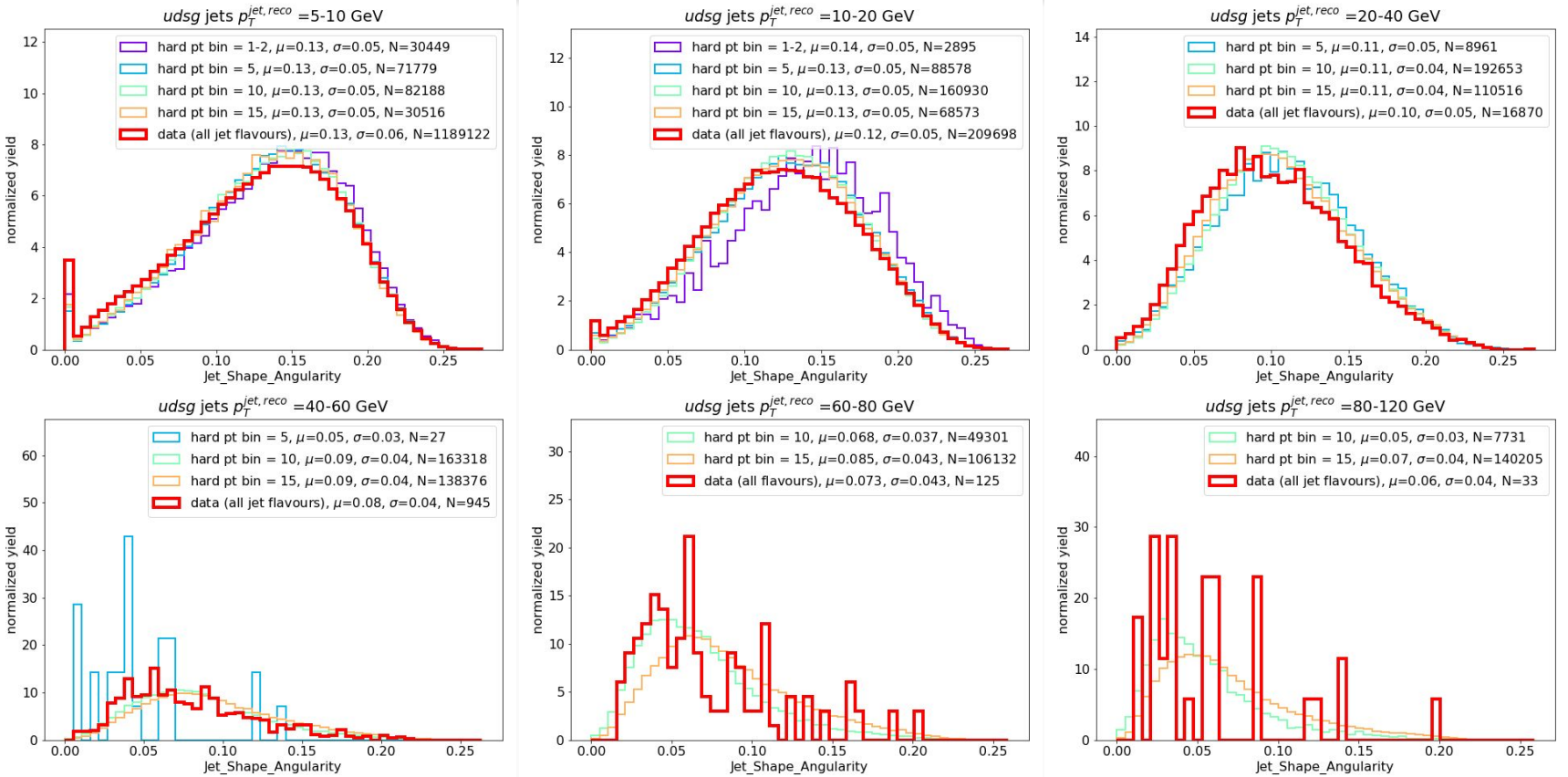






jet angularity

data slightly shifted towards lower values, harder ptbins closer



Outline

1. What was done
2. **Issues and questions**
3. Plans for next week

Issues and questions

- How various hard pt bins should be merged?
  based on cross section dependence of pT process?
  One value per hard pT bin?

Outline

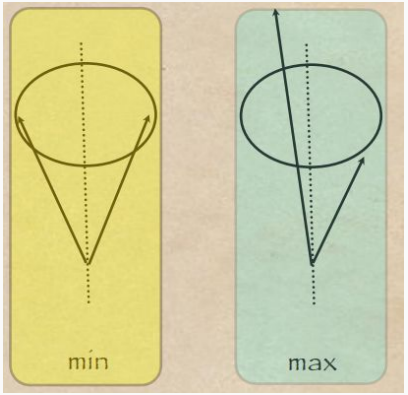
1. What was done
2. Issues and questions
3. **Plans for next week**

Plans for next week

- QA: plot N_jets/N_events run wise (data & MC)
- investigation of differences data - MC mainly for IPd and IPz
  - do tails come from secondaries? if checking origin process is impossible then check production vertex vs IPd/z
  - plot: IP in bins of track pT
- at least 1 track with pT > 5GeV -- used only in data?
- plot: Jet_Area vs Jet_NumTracks -- low area jets are the 1-track-jets?

BACKUP & MC--MC comparison

lower_edges=(5 7 9 12 16 21 28 36 45 57 | 70 85 99 115 132 150 169 190 212 235)
higher_edges=(7 9 12 16 21 28 36 45 57 70 | 85 99 115 132 150 169 190 212 235 -1)

momentum dispersion: $p_T D = \frac{\sqrt{\sum_{i \in jet} p_{T,i}^2}}{\sum_{i \in jet} p_{T,i}}$.

angularity: